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SCIENCE

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THE NEED OF CONSERVATION OF OUR VITAL AND NATURAL RESOURCES AS EMPHASIZED BY THE LESSONS OF THE WAR¹

THE great war, now ended, frightful as have been the evils it entailed on the world, should, from the standpoint of our country at least, be recognized as having brought to us an awakening in directions that will be of lasting benefit to the nation.

It has been a cheap and easy criticism to stigmatize our people as money-loving, self-centered, and materialistic, and this characterization, apparently generally held in Germany as a true picture of the people of the United States and of our national life, has, by some, even here at home, been more or less accepted as correct. The great soul of the American people, their intense patriotism and love of country, their devotion to ideals of right and of self-sacrifice and altruism, were not dormant but were hidden. We have enough of the Anglo-Saxon of our English brethren in us still not to seek to parade our better traits in boasting self-assertion—but when the time of trial and sacrifice comes, our people respond, and respond as a nation.

A marked instance of this national trait was given in our treatment of Cuba twenty years ago. It was incredible to some of our foreign critics that this country could enter into a war with Spain solely to remedy the abuses of her government of Cuba, and to free Cuba, yet the event showed that such was actually the case—and now the world recognizes that we entered into the world-war just ended, solely and only as a matter of high national duty—and with no thought of national gain in money, trade or territory, but only because we recog-

¹ Address of the Vice-President and Chairman of Section of Engineering of the American Association for the Advancement of Science, Baltimore, December 26, 1918.

nized a great duty to the fulfillment of which we must devote ourselves and to which we gave our national life and our nation's full resources.

But while our country entered on this task with no thought of gain, we have, in the accomplishment of duty, received great gain, not only in the spiritual uplift as a nation that we must feel in the realization of what as a nation we have done, but in the material benefits that have come to us from the new conditions forced by war necessities in our business life. These conditions are so many and involve such large and complex issues that they are staggering in their contemplation. Take the railroad situation alone, and consider the immense gain and enlightenment to the country resulting from the far-reaching changes in the government's attitude toward railroad management, necessitated by the war.

For years—for a generation—thoughtful and informed men have realized the want of logic and of business sense typified and enforced by national legislation in the Sherman Act and by the countless restrictive impositions of state legislatures on the proper and business-like management of our railroads—preventing pooling—forcing in the fierce competition for business the routing of freight over unnecessarily long routes—compelling absurdly low rates for service—and other restrictions generally having their incentive in political expediency rather than in careful economic study.

The public has erroneously been taught to believe that drastic uneconomic competition between our railroads, and also between our industries, should be encouraged, and indeed enforced as the law of the land, instead of the encouragement of wise economic cooperative regulation and understanding, tending to secure the best results at a minimum of waste in effort and money.

The war came—urgent war needs in transportation involving the transport of hundreds of thousands of soldiers and of enormous quantities of material, made essential cooperative management of our transportation lines. A Director-General of Railroads was appointed

—and presto, in a night shall we say—all the unnecessary and vexatious restrictions on cooperative methods in our transportation systems were set aside—the government instinctively adopted business methods in the management of business enterprises, the Sherman Act was ignored, and the Interstate Commerce Commission was relegated for the time to dignified isolation and a condition of innocuous desuetude. For years the railroads had urged and shown the impossibility of keeping up their plants and equipment and of rendering due and proper service without proper and adequate remuneration in freight and passenger rates. The government, suddenly saddled with the actual responsibility of operation, and brought fact to face with a realization that the railroads it had taken over could not be run on air, brushed aside statute law and political criticism, and summarily, as a war measure, raised the charges for passenger and freight service, in reality a measure long needed in peace—and the public accepted it all—and labor benefited by increases in pay which the public was forced to provide. In industry the same lesson was enforced by the war. We were suddenly brought to an appreciation of the fact that Germany's conservation policy in her support of the practise of cooperative effort rather than that of destructive competition had built up an organization of economic strength that enabled her, from her national resources at home, without outside aid, to play the aggressive and enormously strong part she maintained up to the very end of the war.

The war has, in transportation and in national industry, taught and enforced on our nation—quick to learn—these lessons of waste in the past and of future economic management by joint cooperative effort, and of all the lessons of conservation of our resources taught by the war, those of needed cooperative effort in our railroad and industrial interests are perhaps the most prominent and important in a material sense, and the lesson has been one not only to and for the public and our national and state authorities, but one by which those interests are directly benefiting. The railroad

managers are diligently studying these problems. They are men of great experience and ability—and the chairman of their association has voiced their progress by publicly saying:

The whole question of the ultimate return of the railroads to private operation has been considered together with the development of a system of public regulation and control for the future which shall not only protect against abuses, but be affirmatively helpful to the development of adequate transportation facilities for the great after-war tasks of the country.

While, as a war measure, the temporary possession and operation of our railroads by the government was necessary, the continuance of such a system in peace, or of any measure of government ownership with its political evils, would be a calamity depriving the traveling public of the efficient operation naturally coming from the initiative and enterprise and sense of responsibility attending individual management, and always absent where governmental red tape and autocratic authority rule, regardless of the comfort or needs of the public. Some reasonable, responsible governmental oversight or control of these great interests is without doubt necessary. The war urgency, the more intimate relations that war needs have established between governmental agencies and railroad and industrial managers, must and will lead to the establishment of systems of regulation not destructive but constructive in character, that will operate to the lasting benefit of our country.

The need of conservation and development of our latent water-power resources has been emphasized by the war. For years, since the public study of the conservation of our natural resources was initiated in 1908 by President Roosevelt's call for a conference of governors of our states to consider the matter—the National Conservation Congress, and Conservation and Forestry Associations throughout the country, have studied the problem of how best to conserve, and yet to use the country's natural resources, in water-power, and in our mines and forests. When we were brought by this war to realize our dependence on Chili for our supply of nitrates in the manufacture of ammunition, while Germany had evolved

and developed economical methods of utilizing her water powers and of extracting nitrogen from the air, we were taught another lesson in conservation and of the folly of our dilatory laissez-faire system of dealing with the water problem. Under war pressure greater progress has perhaps been made than would have been possible in many years of deliberate peace methods. Serious differences of opinion have existed in the past as to the proper measure of governmental control that should be exercised in the development and use of the great latent water powers of the west, and enabling legislation has been impeded and halted by visionary and wholly unpractical objections to such reasonable and liberal legislation as would encourage capital to enter into and support such development. As a wise westerner has said of the development of the west in the past: "The western country was never settled, and never could have been settled, with thirty cents and an infant class," and conservation of our natural resources was well defined by Dr. C. W. Hayes, when chief geologist of the U. S. Geological Survey, as "utilization with a maximum efficiency and a minimum waste."

It is the use, and the avoidance of the abuse, of our natural resources, that conservation properly teaches, not the locking up of these resources. Now in this urgent, intensive war experience a broader national vision has developed. We have learned and have become accustomed to figure in billions, where we used to fear that millions would be wasteful. The government has taken hold of great questions with a giant hand, and has, by its conversion to the truth that in its conduct of great enterprises great men, experienced in the work contemplated, should be used rather than avoided with suspicion, accomplished great results—and the lesson has been enforced that when needed to attain results, large expenditures may lead to the greatest economy in methods and certainly to greater success in the attainment of ends. Our great corporations may, in view of the government's housing programs, be encouraged to feel that proper measures to that end are a necessary concomitant to the maintenance of satisfactory labor conditions, and

are an economic necessity in large and small operations.

One great lesson in conservation peculiarly applicable to our nervous, energetic, and always hard-working people, we have not yet adopted, because we are so constituted that as a nation or a race we will not learn it, is that of the better conservation of our vital resources.

The National Conservation Congress, in its several yearly sessions, has taken, among others, as subjects for study and discussion: Forestry, The Improvement of Farm Conditions, Water Powers and The Vital Resources and Health of our People. When will we learn the lessons of the last, the vital importance to our people of learning to conserve their strength. No one has better epitomized the American wastefulness of vital energy than dear old Mark Twain, who (writing from Naples in 1867), sent us these words, pregnant with the lesson of the higher conservation of life:

We walked up and down one of the most popular streets for some time enjoying other people's comfort and wishing we could export some of it to our restless, driving, vitality-consuming marts at home. Just in this one matter lies the main charm of life in Europe—comfort. In America, we hurry, which is well; but when the day's work is done, we go on thinking of losses and gains, we plan for the morrow, we even carry our business cares to bed with us, and toss and worry over them when we ought to be restoring our racked bodies and brains with sleep. We burn up our energies with these excitements, and either die early or drop into a mean and lean old age, at a time of life they call a man's prime in Europe. When an acre of ground has produced long and well, we let it lie fallow and rest for a season; we take no man clear across the continent in the same coach in which he started; the coach is stabled somewhere on the plains and its heated machinery allowed to cool for a few days; when a razor has seen long service and refuses to hold an edge, the barber lays it aside for a few weeks and the edge comes back of its own accord. We bestow thoughtful care upon inanimate objects but none upon ourselves. What a robust people, what a nation of thinkers we might be, if

we would only lay ourselves on the shelf occasionally and renew our edges.

Surely Mark was right in this.

We owe a duty of watchfulness to the men, devoted to public service, who ably lead great movements for the betterment of conditions among our people—men who are not only captains of industry, but generals in the army of public service, and leaders and exemplars in the pursuit of public duty. They become in leading these great movements, in a measure, the custodians of the public welfare, but "*Quis custodiet ipsos custodes?*" Who shall care for these very generals, and see that they conserve the store of intelligence, patriotism and energy, that goes out from them to public welfare, that it may not be prematurely exhausted? Surely we should take measures to have them feel how the nation values them as a public asset, and how they owe it to their country as well as to their homes to heed and to preach to others the wise words of Mark Twain.

We perhaps can not conclude that the great war has really taught us to better conserve our vital resources in our men and women, for they have been prodigal in expenditure of their strength in national service, but may we not hope that following the past one hundred years of uninterrupted peace between the English-speaking peoples of the world, the closer bond that the war has promoted between our English brethren and ourselves, while giving them a better and closer estimate of us, may bring to us a better appreciation of the value of conserving life as they conserve it, giving our nation the valued services in their advanced years of men who, under our more intensive life, would have reached their limit of usefulness.

To our engineering profession is due the early study of the doctrines of conservation, later taken up by our publicists and legislators. Conservation is primarily an engineering question. At the first, the organization meeting of the American Institute of Mining Engineers, held in May, 1871, now nearly half a century ago, which I attended, a committee was appointed "to consider and report on the

waste in coal mining" and as the whole subject of the conservation of all our resources developed and was studied, it has always been the engineers of the country, qualified by training, expert knowledge, and intelligence, who have led and must now lead in the study and broad consideration of our best national policy in conservation. It is the duty of engineers to keep in the forefront of the study and teaching of this matter, and to do their expert share towards shaping the policy of the nation to a course based on reason, economic principles and technical knowledge, rather than on sentimental or political diatribe. A greater danger is threatened to the public interests by the untrained, spasmodic, semi-political, and careless presentation and handling of these matters before the public, by men on whom their importance has suddenly dawned, than by a continuance of erroneous methods of the past. The trouble with most of the plans for railroad and business regulation, and for mineral and water-power conservation, proposed by men untrained and inexperienced in engineering and in business and financial methods and problems, is that their plans are apt to be ideal rather than real, their dicta negative and destructive rather than affirmative, positive and constructive, and their remedies untried and theoretical experiments, rather than of practical and efficient effect.

We should recognize, and this great war's awakening and upturn of all preconceived and preexisting conditions has emphasized, the importance of business-like rather than political management of our national transportation and industrial interests, and of all other national affairs involving expert scientific or business knowledge and training. Our country owes an incalculable debt of gratitude and appreciation to the great interests that have led in and made possible the wonderful transportation and industrial development of our land, and we may find that on a large scale we will be killing the goose that lays the golden egg of national prosperity, if we suffer our railroads and our great industries to be nagged and oppressed to the point of possible insolvency by blind unreasoning prejudice largely born of

ignorance, and largely based on political considerations that should not control. The present agitation of the whole subject has a high educational value for our people, and we may be certain that we can in the end trust the horse-sense, the intelligence that in the long run is characteristic of our people, not to be finally led away by 'isms or wild theories, but to use in the final determination of these questions that independence of judgment and sound common sense so characteristic of and inherent in the American people, and for which our politicians so often make the mistake of not giving the people credit.

What better summary of the existing conditions following the war has or can be given than the following from the *St. Louis Star*, comprehensive in its scope, yet wonderfully succinct in its statement?

A GREATER HUMANITY RISES FROM WAR

During the process of readjustment we shall profit from the lessons the war has taught. In that, aside from freedom for all the peoples of the world, will lie the greatest achievement of the war. When the balance is struck the profit will outweigh the loss. The human lives sacrificed will yield a better and a greater humanity. The cost in dollars will be absorbed quickly in passing years. The material gains will live and produce.

We, in America, have learned something of our strength. We have learned the possibilities of our united effort. We have learned economy. We have learned concentration. These things will mold themselves into our national character. We shall act with a new inspiration. We shall feel a new confidence. We shall have a new consciousness of the invincibility of righteous purpose.

HENRY STURGIS DRINKER

LEHIGH UNIVERSITY

CHEMISTRY AND MEDICINE: A TRIBUTE TO THE MEMORY OF JOHN HARPER LONG¹

Dr. Long's life and work, so ably portrayed by Professor Dains, are an eminent instance of

¹ An address given November 22, 1918, before a joint meeting of the Institute of Medicine of Chicago and the Chicago Section of the American Chemical Society.